1. A method for removing a solute from a fluid, the method comprising:

adding a coagulant to the fluid to transform a solute from a dissolved state to a non-dissolved, particulate state forming colloids, and to destabilize the colloidal suspension of said particulates by reducing any charge on the surfaces of said particulates responsible for repulsion between them;

collecting the colloids for removal from the fluid including the steps of adding a magnetic seed to the fluid and adding a flocculant to the fluid to form flocs;

separating the flocs by sedimentation after flocculation has been completed to remove the flocs leaving a clear fluid overflow; and

magnetically filtering small flocs from said overflow.

2. The method of claim 1 further including the step of applying a conditioning magnetic field before flocculation to a fluid which includes a substance dissolved therein in the state of a solute and magnetically enhancing the change of the form of the substance from a dissolved state, to a non-dissolved state, namely a particulate form state, to thereby enhance precipitation of the solute for coagulation, wherein the conditioning magnetic field has an average flux density in the range of greater than 0.2 Tesla to 6.0 Tesla and a field gradient in the range of greater than 60 Tesla/meter to 2000 Tesla/meter, and is parallel to the direction of fluid flow.

3. The method for removing solutes of claim 1 in which collecting includes recirculating the magnetic seed after removing the flocs from the fluid.

4. The method for removing solutes of claim 3 in which recirculation includes regeneration of said magnetic seed.

5. The method for removing solutes of claim 4 in which regeneration includes demagnetization.

6. The method for removing solutes of claim 5 in which demagnetization includes applying a magnetic field in the range of 0.1 to 1.0 Tesla at 400 Hertz.

7. The method for removing solutes of claim 4 in which regeneration includes cleaning the surface of said magnetic seed.

8. The method for removing solutes of claim 7 in which cleaning the magnetic seed includes washing the magnetic seed with acid.

9. The method for removing solutes of claim 4 in which regeneration includes drying the magnetic seed at a high temperature to calcine the seed surface.

10. The method for removing solutes of claim 9 in which drying the magnetic seed includes heating the magnetic seed with microwaves.

11. The method for removing solutes of claim 3 in which recirculating the magnetic seed includes secondary magnetic filtration of said magnetic seed from the flocs by applying a secondary magnetic field to said flocs.

12. The method for removing solutes of claim 11 in which the secondary magnetic field has an average flux density in the range of 0.1 to 2.0 Tesla.

13. The method for removing solutes of claim 11 in which the secondary magnetic field has a field gradient in the range of 1 to 1000 Tesla/meter.

14. The method for removing solutes of claim 11 in which said secondary magnetic field is applied parallel to a direction of fluid flow.

15. The method for removing solutes of claim 11 in which recirculating the magnetic seed includes flushing the magnetic seed with water.

16. The method for removing solutes of claim 3 in which said collecting includes shearing said flocs into small pieces.

17. The method for removing solutes of claim 16 in which said shearing includes agitating said flocs.

18. The method for removing solutes of claim 16 in which shearing includes shearing said flocs through turbulent fluid flow.

19. The method for removing solutes of claim 1 in which said magnetically filtering includes primary magnetic filtration by applying a primary magnetic field to the flocs, after flocculation has been completed, to remove the flocs from said overflow.

20. The method for removing solutes of claim 19 in which the primary magnetic field has an average flux density in the range of 0.1 to 6.0 Tesla.

21. The method for removing solutes of claim 19 in which said primary magnetic field has a field gradient in the range of 1 to 2000 Tesla/meter.

22. The method for removing solutes of claim 19 in which the primary magnetic field is applied parallel to the direction of a fluid flow.

23. The method for removing solutes of claim 1 in which the magnetic seed is magnetite.

24. The method for removing solutes of claim 1 in which said magnetite provides a surface for the collection of microbiological contaminants from said fluid.

25. The method for removing solutes of claim 24 in which said biological

contaminants are chosen from the group consisting of bacteria, viruses and pathogens including cryptosporidium parvum and giardia lablia.

26. The method for removing solutes of claim 1 in which said magnetic seed accelerates the settling velocity of said flocs.

27. The method for removing solutes of claim 26 in which said settling velocity is greater than 0.5 cm/sec.

28. The method for removing solutes of claim 1 in which collecting includes mixing at low r.p.m.'s, after adding flocculant, to create large, loose flocs.

29. The method for removing solutes of claim 28 in which the mixing at low r.p.m.'s occurs for at least 30 seconds.

30. The method for removing solutes of claim 1 in which the coagulant is alum.

31. The method for removing solutes of claim 30 in which the percent by volume of alum is as a 48.6% solution and fed in the system at a rate of 10 to 100 ppm.

32. The method for removing solutes of claim 2 in which said conditioning magnetic field gradient is 100 Tesla/meter.

33. The method for removing solutes of claim 1 in which said fluid contains less than 0.1 ppm of solute after collecting the colloids.

34. The method for removing solutes of claim 1 in which the coagulant is ferric chloride.

35. The method for removing solutes of claim 1 in which the coagulant is lime.

36. The method for removing solutes of claim 1 in which the flocculant is anionic.

37. The method for removing solutes of claim 1 in which the flocculent is cationic.

38. The method for removing solutes of claim 1 further including the step of adding a nucleation agent to increase available solute particles to form colloids.

39. The method for removing solutes of claim 38 in which said nucleation agent is bentonite.

40. The method for removing solutes of claim 1 in which the solute is phosphate.

41. The method for removing solutes of claim 1 in which said collecting further includes recirculating the flocs.

42. The method for removing solutes of claim 41 wherein said floc can be recirculated up to ten times.

43. A system for removing a solute form a liquid comprising:

means for adding a coagulant to the fluid to coagulate the solute particles to form colloids;

means for collecting the colloids from the liquid, said means for collecting including seeding means for adding magnetic seed to magnetically condition said fluid and flocculation means for producing flocs of said solute particles; and

separator means responsive to said flocculation means for separating said flocs from said fluid, said separator means including sedimentation means in which said flocs settle to the bottom of said sedimentation means and clear fluid overflows said sedimentation means, said separator means further including magnetic filtration means for filtering small flocs from said fluid overflow.

44. The system for removing solutes of claim 43 in which said means for collecting further includes seed collection means for collecting the magnetic seed from the separated flocs and recirculating means for recirculating said magnetic seed collected by said seed collection means to said seeding means.

45. The system for removing solutes of claim 44 in which said recirculating means includes regeneration means for regenerating said magnetic seed.

46. The system for removing solutes of claim 45 in which said regeneration means includes drying means.

47. The system for removing solutes of claim 46 in which said drying means includes microwave means for applying microwave energy to said magnetic seed to dry the seed.

48. The system for removing solutes of claim 46 in which said regeneration means includes demagnetization means for demagnetizing said magnetic seed.

49. The system for removing solutes of claim 46 in which said regeneration means includes acidic wash means for cleaning the surface of said magnetic seed.

50. The system for removing solutes of claim 43 in which said separator means further includes recirculation means for recirculating said flocs to said means for collecting.

51. The system for removing solutes of claim 44 in which said seed collection means includes secondary magnetic filtration means.

52. The system for removing solutes of claim 51 in which said secondary magnetic filtration means includes a secondary magnetic separator.

53. The system for removing solutes of claim 52 in which said secondary magnetic separator is a continuous high gradient magnetic separator.

54. The system for removing solutes of claim 52 in which said secondary magnetic separator is a cyclic high gradient magnetic separator.

55. The system for removing solutes of claim 52 in which said secondary magnetic separator is a wet-drum type magnetic separator.

56. The system for removing solutes of claim 52 in which said secondary magnetic separator includes a filamentary matrix.

57. The system for removing solutes of claim 44 in which said seed collection means further includes shearing means for separating said magnetic seed from said flocs.

58. The system for removing solutes of claim 43 in which said magnetic filtration means includes primary magnetic filtration means, responsive to said magnetic seeds, for applying a primary magnetic field to said flocs to separate said flocs from said fluid.

59. The system for removing solutes of claim 58 in which said primary magnetic filtration means includes a primary magnetic separator.

60. The system for removing solutes of claim 59 in which said primary magnetic separator is a continuous high gradient magnetic separator.

61. The system for removing solutes of claim 59 in which said primary magnetic separator is a cyclic high gradient magnetic separator.

62. The system for removing solutes of claim 59 in which said primary magnetic separator is a wet-drum type magnetic separator.

63. The system for removing solutes of claim 59 in which said primary magnetic separator includes a filamentary matrix.

64. The system for removing solutes of claim 58 in which said primary magnetic field is a high field of at least 0.1 Tesla.

65. The system for removing solutes of claim 58 in which said primary magnetic field has a high magnetic field gradient of at least 1 Tesla/meter.

66. The system for removing solutes of claim 43 in which said magnetic seed is magnetite.

67. The system for removing solutes of claim 66 in which said magnetite provides a surface for the collection of microbiological contaminants from said fluid.

68. The system for removing solutes of claim 67 in which microbiological contaminants are chosen from the group consisting of bacteria, viruses and pathogens

including cryptosporidium parvum and giardia lamblia.

69. The system for removing solutes of claim 43 in which said magnetic seed accelerates the settling velocity of said fluid.

70. The system for removing solutes of claim 69 in which said settling velocity is greater than 0.5 cm/sec.

71. The system of claim 43 further including means for magnetically conditioning the fluid before flocculation by applying a conditioning magnetic field parallel to a direction of fluid flow and having an average flux density in the range of greater than 0.2 Tesla to 6.0 Tesla and a field gradient in the range of greater than 60 Tesla/meter to 2000 Tesla/meter, to enhance the precipitation of solute particles for coagulation.

72. The system for removing solutes of claim 71 in which said means for magnetically conditioning includes a filamentary matrix.

73. The system for removing solutes of claim 71 in which said filamentary matrix comprises stainless steel.

74. The system for removing solutes of claim 73 in which said stainless steel has been cold worked to induce an austenitic to martensitic phase transformation.

75. The system for removing solutes of claim 72 in which said matrix is bounded by an iron bound solenoid.

76. The system for removing solutes of claim 75 in which said matrix is bounded about its periphery by a DC energizing coil for producing said magnetic field.

77. The system for removing solutes of claim 72 in which said filamentary matrix comprises an upstream end and a downstream end, said upstream end bounded by a first magnetic pole having a plurality of passage ways therethrough and said downstream end bounded by a second magnetic pole having a plurality of passage ways therethrough, such that a fluid flow is allowed to pass through said first magnetic pole, said upstream end, said downstream end and said second magnetic pole.

78. The system for removing solutes of claim 77 in which said first and said second magnetic poles are oriented to provide uniform application of the conditioning magnetic field to said matrix.

79. The system for removing solutes of claim 72 in which said filamentary matrix has length of 6 to 12 inches in the direction of a fluid flow.

80. The system for removing solutes of claim 71 in which said filamentary matrix is bounded at an upstream end by a first permanent magnet and at a downstream

end by a second permanent magnet, said permanent magnets producing said conditioning magnetic field.

81. The system for removing solutes of claim 71 in which said means for magnetically conditioning includes an outlet port for discharging said fluid to a region of non-turbulent flow.

82. The system for removing solutes of claim 81 in which said region provides a retention time of at least 15 seconds to enhance formation of said colloids.

83. The system for removing solutes of claim 71 in which said means for magnetically conditioning further includes an upstream end and a downstream end, and said means for adding a coagulant further includes introduction means for introducing said coagulant to said fluid.

84. The system for removing solutes of claim 83 in which said introduction means further includes distribution means for uniformly distributing said coagulant over said upstream end.

85. The system for removing solutes of claim 43 in which said means for adding a coagulant further includes nucleation means for adding a nucleation agent.

86. The system for removing solutes of claim 71 in which said means for

magnetically conditioning includes an upstream end and a downstream end and inlet means for uniformly introducing said fluid over said upstream end of said means for magnetically conditioning.

87. The system for removing solutes of claim 43 in which said fluid contains less than 0.1 ppm of solute after removal of the solute particles.

88. The system for removing solutes of claim 43 in which the solute is phosphate.

89. The system for removing solutes of claim 43 in which said fluid flows at a rate of 10 cm/sec.

90. A method for removing a solute from a fluid, the method comprising:

adding a coagulant to the fluid to transform a solute from a dissolved state to a non-dissolved, particulate state forming colloids, and to destabilize the colloidal suspension of said particulates by reducing any charge on the surfaces of said particulates responsible for repulsion between them;

collecting the colloids for removal from the fluid including the steps of adding a magnetic seed to the fluid and adding a flocculant to the fluid to form flocs;

separating the flocs by sedimentation after flocculation has been completed to remove the flocs leaving a clear fluid overflow;

recirculating said flocs, said recirculation providing for reflocculation of said fluid; and

magnetically filtering small flocs from said overflow.

91. A system for removing a solute from a fluid comprising:

means for adding a coagulant to the fluid to coagulate the solute particles to form colloids;

means for collecting the colloids from the fluid, said means for collecting including flocculation means for producing flocs of said solute particles and seeding means for adding magnetic seed to magnetically condition said fluid; and

separator means responsive to said flocculation means for separating said flocs from said fluid, said separator means including sedimentation means in which said flocs settle to the bottom of said sedimentation means and clear fluid overflows said sedimentation means, said separator means further including magnetic filtration means for filtering small flocs from said fluid overflow; and

recirculating means responsive to said clear fluid overflow from said sedimentation means for recirculating said fluid to said flocculation means.

92. A system for removing a solute from a fluid comprising:

a coagulation tank for receiving the fluid with solute particles therein and for receiving a coagulant for coagulating the solute particles to form colloids;

a seeding tank for receiving the fluid containing the colloids and for receiving magnetic seed to magnetically condition the fluid;

a flocculation tank for receiving the fluid and for receiving a flocculant for producing flocs of said solute particles; and

a separator for receiving the fluid having flocs therein for separating the flocs from the fluid, the separator including a settling tank in which the flocs settle to the bottom of the settling tank and clear fluid overflows the settling tank, the separator further including a magnetic filter for filtering small flocs from said fluid overflow.